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(71) Applicant : **KRAFT GENERAL FOODS, INC.**
250 North Street
White Plains New York 10625 (US)

(72) Inventor : **Hembling, Mark Victor**
6 Old Bridge Road West
New Fairfield, Connecticut 06812 (US)

Inventor : **McCarty, Lawrence Thomas**
5 Pheasant Ridge Road
Ossining, New York 10562 (US)
Inventor : **Stephenson, Julia Anne**
26 Rock Street
Cold Spring, New York 10516 (US)
Inventor : **Szewczyk, Eva Consuelo**
66 Sycamore Road
Jersey City, New Jersey 07305 (US)
Inventor : **Bertalan, Charles William**
249 Hamilton Street
New Brunswick, New Jersey 08901 (US)
Inventor : **DeStephano, Joseph Philip**
1272 Heath Court
Mahwah, New Jersey 07430 (US)

(74) Representative : **Eyles, Christopher Thomas**
W.P. THOMPSON & CO.
Celcon House
289-293 High Holborn
London WC1V 7HU (GB)

(54) Quick-setting dessert gel mix.

(57) A dry mix for producing a quick-setting gel which has a texture which is as desirable as gelatin gels. The mix contains as components agglomerated potassium or sodium alginate, agglomerated calcium salt, sweetening agents, food acids, buffering agents and preferably anti-oxidant. The sweetening agents can be sugars, intensive sweeteners and/or hydrolyzed starches.

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FIELD OF INVENTION

This invention relates to a gel-forming composition and more particularly to a one-package, gel-forming, dry-mix composition which rapidly form a gel having a texture which is equally as preferred as conventional gelatin dessert gels.

DESCRIPTION OF PRIOR ART

Gelatin dessert gels are well-known and highly regarded by consumers. However, as crystalline gelatin is not soluble in cold water, recipes for making gelatin gels call for dissolution of the gelatin in boiling water. The gelatin solution must then be cooled to below about 70°F (21.1°C) in order to effect gelation. Typically about a two-hour period is necessary in order to produce gelatin desserts. There has long been a desire to provide a gelatin dessert in quick-gel form. Such a product would not have to be prepared hours in advance of consumption, but could be made ready for consumption within minutes. The prior art has disclosed methods for producing cold-water soluble gelatin; however, the length of time needed to set the gel is still in the one to two hour range.

Pectin has been the basis of many attempts to provide cold water-soluble, quick-set dessert gels. Low-methoxyl (LM) pectins have the property of quickly forming gels in water solution upon the addition of a calcium salt or salts of other metals of the alkaline earth series. However, if a mixture of LM pectin and soluble calcium salt is added directly to cold water, gelation will be initiated before the LM pectin has fully dissolved. Such partial or premature gelling prevents further dissolution of the pectin material and results in a mushy or soupy mass as an end product.

Attempts have been made to overcome the problem of too rapid setting of LM pectin gels by means of a two-package system wherein the pectin would first be fully dissolved before addition of calcium salt. Such efforts have not been commercially successful because of the inconveniences involved in the use of separated reactants and/or inferior textures. Other attempts have sought to physically retard the solution of the calcium salt such as by coating the salt with a vegetable or artificial gum or by the use of heat-treated anhydrous monocalcium phosphate. Methods for increasing the solubility of LM pectin in cold water to approach that of the calcium salt, such as by co-drying the pectin with sugars, have also been attempted. These and other efforts at producing one-package, quick-set gels based on LM-pectin are described in U.S. Patent Nos. 2,559,338 to Barch, 2,673,757 to Shepard et al., 2,701,767 to Twieg et al. 2,809,894 to Poarch et al., and 4,268,533 to Williams et al. None of these techniques have, however, been able to offer a one-package, quick-set gel which has a texture as desirable as the highly-regarded and accepted texture of gelatin gels.

Attempts have also been made at producing dessert gels from carrageenans (e.g. kappa-carrageenan) that gel at room temperature in the presence of potassium ions; however, the resulting gel texture is quite inferior to that of gelatin gels. Sodium alginate has also been suggested for use in forming dessert gels.

SUMMARY OF THE INVENTION

The present invention describes a dry mix for producing a quick-set alginate gel which has a texture as desirable in mouthfeel to gelatin gels. The mix is comprised of agglomerates of sodium or potassium alginate powder (100% through No. 230 U.S. mesh sieve (100% <63 μm), with a mean particle diameter of 10 to 60 microns), agglomerates of slowly soluble calcium salts (e.g., calcium citrate, carbonate, phosphate, sulfate and/or tartrate), food acid, buffering agent and sweetening agent. The sweetening agent includes sugars, water-soluble hydrolyzed starch solids and/or intensive sweeteners such as aspartame, asulfame-K, sucralose, saccharine, dihydrochalcone, cyclamate and the like.

As used herein all percentages are by weight unless specifically stated otherwise.

DETAILED DESCRIPTION OF THE INVENTION

Sodium or potassium alginate is ground and sieved as needed to obtain a fraction which is 100% minus 200 U.S. mesh (100% <75 μm), preferably 100% minus 230 U.S. mesh (100% <63 μm) and having an average mean particle sizes diameter of from 10 to 60 microns, preferably about 30 microns. It has been found that these small-sized particles aid in producing a smooth texture in the prepared dessert gel. This alginate powder is then agglomerated to ensure dispersibility of the fine alginate particles which, in the absence of agglomeration, would clump on contact with water. Agglomeration will be effected using an aqueous agglomerating fluid which may be water or water with a minor (e.g., up to 20%, preferably up to 10%) amount of an agglomerating aid, such as triacatin, or other surface active dispersing aids.

Agglomeration of the alginate powder may be effected utilizing standard equipment and methodology such as by batch or continuous fluid bed agglomeration or continuous co-current or countercurrent tower agglomeration. The alginate agglomerates are sieved to scalp off over-sized clusters which would be slow to dissolve to obtain a fraction with 100% being minus 16 U.S. mesh (100% <1.18 mm), preferably 100% minus 20 U.S. mesh (100% <850 μm) and with no more than 50% passing through a 170 U.S. mesh sieve (≦50% <90 μm), preferably with no more than 50% passing through a 140 U.S. mesh sieve (≦50% <106 μm) sieve. Undersized particles out of the agglomerator may be recycled and oversized particles may be ground to proper size. The alginate powder may be co-agglomerated with another of the gel mix ingredients, such as sugar and/or dextrin, but this typically will not be done as there is not a need to incur this increased processing cost.

The slowly water-soluble calcium salt, such as calcium sulfate is also agglomerated either per se or with up to 90% of a water-soluble, carbohydrate filler such as maltodextrin and/or sugars. Calcium salt agglomeration can be facilitated by utilizing aqueous agglomerating fluids as described above or utilizing straight water with no surfactant and can be effected by means of conventional agglomeration techniques also as described above. Agglomeration of the calcium salt is desired in order to slow dissolution of calcium during preparation of the dessert so that most of the alginate is dispersed and dissolved prior to significant build-up of calcium ion concentration. To protect against the effects of hard water which is present in many households and which may contain up to and in excess of 400 p.p.m. total hardness (i.e., a combination of dissolved calcium and magnesium), the dessert gel mix of this invention will contain a buffering agent which includes a monovalent cation, such as trisodium citrate. Other suitable buffers would be sodium and potassium phosphates, sodium and potassium acetates, tartrates, malates, fumarates, adipates and ascorbates and potassium citrate.

The dessert gel mix of the present invention will also contain-sweetening agents, food acids, flavors and colors. Preferably an anti-oxidant, such as ascorbic acid, erythorbic acid or tocopherols, such as vitamin E, is also included to further increase clarity of the prepared dessert gel.

It will also be desirable to maintain the level of soluble solids in the dessert gel to at a relatively low level in order to increase clarity of the prepared dessert gel. This feature is due to the finding that as the solids level increases in the dessert gel more air is forced of solution and this undissolved air detracts from the clarity of the gel. Obviously this problem is most apparent in full sugar versions (i.e., no intensive sweetener present) of the dessert mix. Sugar solids can however be reduced by substituting fructose for a portion of the sucrose. Sucrose will normally be utilized to provide at least a portion of the sweetness in any sugar-containing gel mix of this invention. To aid in the dispersibility of the mix a portion (e.g., 5 to 60%) of the sucrose may be in powdered form with the remainder being granulated.

The acid component is employed to give the desirable sour taste and pH of conventional fruit-flavored dessert gels. Acids such as citric, adipic, fumaric, malic and/or tartaric may be employed. The amount of acid employed is sufficient to give a final pH in the prepared dessert gel of between 3.5 and 5.5, preferably between about 4.2 and 4.8.

The following formulations represent the dry mix compositions of this invention and are set forth in three variants of full-sugar, reduced-sugar and sugar-free, each with a broad range and a preferred range.

Ingredient	Full Sugar		Reduced Sugar		Sugar Free	
	Broad	Preferred	Broad	Preferred	Broad	Preferred
	(%)	(%)	(%)	(%)	(%)	(%)
Sucrose	30-95	40-70	30-80	60-75	-	-
Fructose	0-50	25-45	0-40	10-30	-	-
Intensive Sweeteners	-	-	.01-1	.1-.5	.2-4	.5-3
Carbohydrate Bulking Agent (e.g., malto-dextrin)	-	-	-	-	35-80	60-75
Agglomerated Potassium Alginate	2-5	2.8-4.0	3.5-15	4-8	5-20	7-15
Agglomerated Calcium Salt (w/o fillers)	0.2-1.2	0.4-0.8	.5-3	.7-1.5	.6-4	1-3
Food Acid	1.5-6	2.5-4.5	3-12	4-10	5-15	6-12
Buffer Agent	1.5-6	2-4	3-12	4-8	4-15	6-12
Anti-Oxidant	0-1.5	0.3-0.8	0-1.5	0.3-1.2	0-2.5	0.8-1.6
Flavor/Color	as needed		as needed		as needed	

The dry dessert mixes of this invention are able to produce a dessert gel within about 20 minutes or less. Formulas which can produce gels within as little as five minutes are possible. Preparation is a simple matter of combining the dry mix with water. Cold tap water is preferred as colder water will retard dissolution of the calcium salt resulting in gels of improved texture. However, water temperature can range from 32 to 80°F (0 to 26.7°C). A spoon, fork or wire whisk can be used to dissolve the mix in water. An electric mixer is not needed. Stirring for less than two minutes, typically less than one minute, will suffice to achieve complete dissolution. An alginate will set within 20 minutes either in or out of a refrigerator. Usually, however, the ungelled mixture is placed in a refrigerator to set so that it will be chilled prior to being served. The resulting gel has a texture which is as desirable as gelatin gels.

This invention is further described but not limited by the following examples.

EXAMPLE 1

A full-sugar, quick-setting, dessert gel mix was prepared. Potassium alginate was ground and sieved to obtain a fraction of 100% minus 230 U.S. mesh (100% < 63 μm) and having a target mean particle diameter of 30 microns. This alginate fraction was agglomerated using a solution of 2.5% triacetin in distilled water. The solution was employed at a level of 1.5 parts triacetin per 100 parts potassium alginate. Agglomeration was conducted in a batch-type, fluid-bed agglomerator, with drying of the agglomerate taking place in the agglomerator. Calcium sulfate was combined with an equal weight of 10DE maltodextrin and the mixture was agglom-

erated as above, but using only distilled water. Agglomerates larger than 14 U.S. mesh (> 1.49 mm) were removed for regrinding. The dry mix was prepared in a ribbon blender by combining the following ingredients:

Ingredient	Parts By Weight
Granulated Sucrose	49.7
Crystalline Fructose	32.8
Powdered Sucrose	5.0
Agglomerated Potassium Alginate	3.7
Adipic Acid	2.8
Ascorbic Acid	0.6
Trisodium Citrate, Dihydrate	2.8
Agglomerated Calcium Sulfate/Maltodextrin	1.0
Flavor/Color	0.4

98.8 grams of this mix was added to 2 cups (474 ml) of cold tap water, stirred with a spoon for about 50 seconds, poured in four 4-ounce (118 ml) cups and refrigerated for 15 to 20 minutes. The resulting gel was judged by a sample of 470 consumers as being equally preferred to like flavored commercial gelatin dessert gels.

EXAMPLE 2

A reduced-sugar, quick-setting, powdered dessert gel mix was prepared as in Example 1 by combining the following ingredients:

Ingredient	Parts By Weight
Granulated Sucrose	35.0
Powdered Sucrose	5.0
Agglomerated Potassium Alginate (per Example 1)	3.6
Adipic Acid	3.0
Tri-Sodium Citrate, Dihydrate	2.8
Agglomerated Calcium Sulfate/Maltodextrin (per Example 1)	0.9
Ascorbic Acid	0.25
Aspartame	0.14
Ascesulfame-K	0.05
Flavor/Color	0.4

51.14 grams of the mix was prepared as a gelled dessert as in Example 1. The resulting gel was judged by a ten-member taste panel as being close to that of Example 1 in terms of taste/texture and in addition was judged as being somewhat clearer.

EXAMPLE 3

A sugar-free, quick-setting, powdered dessert gel mix was prepared as in Example 1 by combining the following ingredients:

Ingredient	Parts By Weight
10DE Maltodextrin	24.0
Agglomerated Potassium Alginate (per Example 1)	3.5
Adipic Acid	3.0
Tri-Sodium Citrate, Dihydrate	2.8
Agglomerated Calcium Sulfate/Maltodextrin (per Example 1)	0.9
Ascorbic Acid	0.15
Aspartame	0.28
Ascesulfame-K	0.09
Flavor/Color	0.4

35.12 grams of this mix was prepared as a gelled dessert as in Example 1. The resulting gel was judged by a ten-member taste panel as being close to Example 1 in terms of taste/texture and was also noted as being very clear.

Claims

1. A dry mix for producing a quick-setting, sweetened, edible gel comprising agglomerated potassium or sodium alginate, said agglomerates being 100% minus 16 U.S. mesh sieve (100% <1.18 mm), with no more than 50% passing through a 170 U.S. mesh sieve (≦50% <90 μm) and said agglomerates being formed from particles of potassium or sodium alginate having a mean particle diameter of 10 to 60 microns, a sweetening agent, a food acid, a buffering agent, and an agglomerated calcium salt.

2. A dry mix according to claim 1 for producing a quick-setting, sugar-sweetened, edible gel comprising on a weight basis:
   (a) 80 to 95% sugars;
   (b) 2 to 5% agglomerated potassium or sodium alginate, said agglomerates being 100% minus 16 U.S. mesh sieve (100 <1.18 mm), with no more than 50% passing through a 170 mesh sieve (≦50% <90 μm) and said agglomerates being formed from particles of potassium or sodium alginate having a mean particle diameter of 10 to 60 microns;
   (c) 1 to 6% food acid;
   (d) 1 to 6% buffering agent; and
   (e) 0.25 to 1.0% of agglomerated calcium salt.

3. A dry mix according to claim 1 for producing a quick-setting, reduced-sugar edible gel comprising on a weight basis:
   (a) 60 to 80% sugars;
   (b) 4 to 10% agglomerated potassium or sodium alginate, said agglomerates being 100% minus 16 U.S. mesh sieve (100% <1.18 μm), with no more than 50% passing through a 170 U.S. mesh sieve (≦50% <90 μm) and said agglomerates being formed from particles of potassium or sodium alginate having a mean particle diameter of 10 to 60 microns;
   (c) 3 to 12% food acid;
   (d) 2 to 12% buffering agent;
   (e) 0.5 to 2.0% of agglomerated calcium salt; and
   (f) .05 to 2% intensive sweetener.

4. A dry mix according to claim 2 or claim 3, wherein the sugars consist of sucrose and fructose at a weight ratio of 1:0.3-1.0.

5. A dry mix according to claim 1 for producing a quick-setting, sugar-free edible gel comprising on a weight basis:
(a) 40-75% water-soluble carbohydrate bulking agent;
(b) 6-18% agglomerated potassium or sodium alginate, said agglomerates being 100% minus 16 U.S. mesh sieve (100% <1.18 μm), with no more than 50% passing through a 170 U.S. mesh sieve (≦ 50% <90 μm), and said agglomerates being formed from particles of potassium or sodium alginate having a mean particle diameter of 10 to 60 microns;
(c) 6 to 18% food acid;
(d) 4 to 14% buffering agent;
(e) 1.2 to 5.0% of agglomerated calcium salt; and
(f) 0.1 to 4% intensive sweetener.

6. A dry mix according to claim 3 or claim 5, wherein the intensive sweetener is selected from aspartame, asulfame K, sucralose, saccharine, dehydrochalcone, cyclamate and mixtures thereof.

7. A dry mix according to any one of claims 1 to 6, wherein the calcium salt is co-agglomerated with a water-soluble carbohydrate bulking agent at a weight ratio of 1:0.5-2.

8. A dry mix according to claim 5 or claim 7, wherein the bulking agent is a maltodextrin.

9. A dry mix according to claim 8, wherein the maltodextrin has a D.E. of from 0.5 to 15.

10. A dry mix according to any one of claims 1 to 9, wherein the calcium salt is calcium sulfate, calcium phosphate or calcium citrate.

11. A dry mix according to any one of claims 1 to 10, wherein the alginate agglomerates are 100% minus 20 U.S. mesh (100% <850 μm) with no more than 50% passing through a 140 U.S. mesh sieve (= 50% <106 μm).

12. A dry mix according to any one of claims 1 to 11, wherein the mix further contains an anti-oxidant selected from ascorbic acid, erythorbic acid, tocopherol and combinations thereof.

13. A dry mix according to any one of claims 1 to 12, wherein the mix contains from 0.3 to 0.8% anti-oxidant.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 2334

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	FR-A-1 217 635 (ALGINATE INDUSTRIES LTD.) * the whole document *	1-5,10	A23L1/0532
A	FR-A-1 198 852 (ALGINATE INDUSTRIES LTD.) * the whole document *	1-5,10	
A	BE-A-552 744 (SOCIETE S.A.T.I.A.) * page 2 *	1,2,4,10	
A	DE-B-11 14 695 (HUGO OBERWELLAND) * column 1, line 31 - column 3, line 15 *	1,2,4,10	
A	US-A-3 770 462 (HARRY R. SCHUPPNER, JR.) * claim 1 *	1,2,10	
A	FR-A-2 268 476 (HENKEL & CIE. G.M.B.H.) * claims 1,4,6,7 *	1,2,4,10	
A	DE-A-16 42 545 (GENERAL FOODS CORP.) * page 1 - page 4; claim 1 *	1,2	
A	DATABASE WPI Week 7241, Derwent Publications Ltd., London, GB; AN 72-64630T & CA-A-910 705 (RALSTON PURINA CO.) * abstract *	1,2	TECHNICAL FIELDS SEARCHED (Int.Cl.5) A23L
A	EP-A-0 437 360 (WARNER-LAMBERT COMPANY) * claims 1-5 *	1	
A	EP-A-0 517 423 (KRAFT GENERAL FOODS INC.) * page 2, line 48 - line 50; claims 1-11 *		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	11 July 1994	Alvarez Alvarez, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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